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## Spin Physics with PHENIX Experiment's MPC-EX Calorimeter Upgrade.

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### Abstract:

The PHENIX forward EM calorimeter upgrade, the MPC-EX detector, is a Si-W preshower extension to the existing PHENIX Muon Piston Calorimeters (MPC). The MPC-EX will consist of eight layers of alternating W absorber and Si mini-pad sensors and will be installed for RHIC Run-15 p+p and p+A collisions. Covering a large pseudorapidity range,  $3.1 < \eta < 3.8$ , the MPC-EX and MPC access high-x partons in the projectile nucleon (and low-x partons in the target nucleon) in p+A and transversely polarized proton-proton collisions at 200 GeV. With the addition of the MPC-EX, the neutral pion reconstruction range extends to energies  $> 80$  GeV, a factor of four improvement over current capabilities. The MPC-EX will strengthen PHENIX's existing forward neutral pion and jet-like events measurements, it will also provides the necessary neutral pion rejection to make a prompt photon measurement feasible in both p+A and p+p collisions. With this neutral pion rejection, prompt (direct + fragmentation) photon yields at high  $p_T$ ,  $p_T > 3$  GeV, can be statistically extracted. In p+A collisions direct photons at forward rapidities are optimally sensitive to the gluon distribution. A measurement of the forward prompt photon  $R_{pA}$  and  $A_N$  will cleanly access the gluon nuclear distribution functions and the scale of saturation, and provide important information about the initial state in heavy ion collisions. In transverse p+p collisions the MPC-EX will make possible a measurement of the prompt photon single spin asymmetry  $A_N$ , to address the process dependency of valence quark Sivers distribution.